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gneisses are mainly rocks of igneous origin. While recognizing the undoubted evidence of secondary dynamic action in many regions, and the absence at present of criteria by which original and secondary structures may be discriminated, the authors are strongly of the opinion that much of the banding of gneisses, as distinguished from mere foliation, may be an original structure due to the conditions in which the igneous magma was erupted and consolidated.

The necessity of establishing the prevalence of such differentiated lamination in basic rocks, and of recognizing its occurrence to any considerable extent in granitic masses, is self-evident after the bearing of such facts on the nature and origin of the ancient gneisses has been so clearly set forth.

JOSEPH P. IDDINGS.

Preliminary Report on the Geology of South Dakota. By J. E. TODD, State Geologist. (South Dakota Geol. Surv., Bul. No. 1, 172 pp., 5 plates, Prelim. Geol. Map. Sioux Falls, 1895).

Summaries of the progress up to date along a particular line of work, or of the knowledge of the geology of particular regions are always welcome. This is particularly true when the report covers a region of so wide and varied interest as South Dakota and one the literature of which is so badly scattered. Since the early work of Hayden in the eastern and of Newton and Jenny in the western half of the state the papers on the geology of South Dakota which have appeared have been fragmentary only. They have, however, modified our ideas of the geology of the region in many important regards. As a foundation for the future work of the Geological Survey Todd has brought together in convenient form all this mass of information and has added to it, as a result of his several years work in the region, a great deal that is now for the first time published.

Among the new points which may be noticed are, the recognition of the Silurian as present in the Deadwood section and the pointing out of the beds which must represent the Devonian if it be at all present. A number of caves in the Carboniferous are described in detail. In one of them, Wind cave, is a curious calcite formation called "box-work." The peculiar dome-like surface of the Purple Limestone, it is suggested, may be due to the leaching out of salt beds of irregular thickness below. The marine origin of the Dakota is

argued for, the material of which it is composed being supposed to have been derived from the Sioux quartzite or possibly the Carboniferous of the Mississippi Valley. The author follows King in grouping the Benton, Niobrara and Pierre as Colorado and does not recognize the Montana, the Fox Hills being mapped alone as the Fox Hills Group. In the present state of knowledge this is undoubtedly almost a necessity so far as mapping the area is concerned, but it is to be hoped that more detailed studies will allow the divisions now so generally recognized elsewhere to be differentiated. The White River beds are described in detail, especially interesting notes on the presence in them of sand-dikes being given. At the Bijou Hills a fine-grained quartzite of greenish tinge is noted in the Loup Fork beds. Certain obscure beds of sand and clay in the eastern part of the state and in part in Iowa are somewhat doubtfully referred to latest Pliocene or earliest Pleistocene time and are considered as possible lacustrine beds contemporaneous in age with Lake Cheyenne.

Four moraines are traced: the First or Altamont, Second or Gary, Third, and Fourth. On the map these are not marked, the limit of drift alone being shown. The drift found in the Black Hills region is considered to be "a kind of delta deposit formed by streams shifting to and fro upon a plain of deposition." Some very interesting facts regarding river terraces which may clear up some of the doubt regarding the early history of the rivers in the region are given.

In a résumé of the geological history of the region it is pointed out that the eastern half of the State was dry land during Palæozoic time, and from this it is argued that the condition for the formation of coal existed during the Carboniferous and that mineral may, perhaps, be found to occur in the middle of the State. In the chapter on economic geology the various minerals, building stones, artesian wells, and other similar topics are briefly discussed.

The report contains the usual number, or perhaps more than the usual number, of typographical errors; fortunately, however, very few confuse the meaning. It is an exceedingly compact and valuable compendium of the geology of this comparatively unknown but very rich geological province.

H. F. BAIN.